fairways – daily average of 24 percent v/wc.

To establish moisture parameters, Brown takes daily water content readings, visually observes the plant's response to various moisture contents and verifies course conditions remain firm.

The club achieved water efficiency initially through a joint participation with the USGA. The two paired up to evaluate how accurately remote sensor technology measures moisture and salt content. The program allows Brown to monitor the 3- and 6-inch soil profiles in real time. Because of limited capital improvement funds, Brown couldn't put the entire course on the program and sensor technology, so he purchased a handheld moisture probe that provides data in v/wc. The crew records daily greens and tees measurements.

On the fairways, Brown has compiled maps identifying features such as mounds and low spots and records the data every other day. From the collection of data and run time adjustments, he's been able to stay within 10 percent of the moisture content parameters. Brown's water usage stays close to 20 percent less than daily ET. Since initiating the program, total water usage was reduced 20 percent initially and is 23 percent of estimated use from ET.

TOTAL WATER SAVINGS INITIALLY EQUALED 200,000 GALLONS A DAY AND NOW TREND TOWARD 230,000 GALLONS A DAY DURING THE PRIME GROWING MONTHS.

Total water savings initially equaled 200,000 gallons a day and now trend toward 230,000 gallons a day during the prime growing months (May through October). The daily water savings account for a seasonal reduction of 24 million gallons. Using the sensor during winter has reduced consumption by 12 million more gallons, for a total annual water savings of 36 million gallons.

— John Walsh

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ACCUSATION #3

ACCUSATION #1

Golf courses live by their own set of environmental rules.

THE DEFENSE CALLS TO THE STAND

Chris Tritabaugh, Golf Course Superintendent, Northland Country Club, Duluth, Minn.

REBUTTAL

CHRIS TRITABAUGH is in his fifth year as superintendent at Northland Country Club, a Donald Ross layout nationally regarded as a top-100 classic golf course and in the top five of Minnesota golf courses.

Tritabaugh says that in his five years at the course, the entity that polices his use of pesticides, the Minnesota Department of Agriculture, has never visited to check on his spraying records or to see if those who apply the chemicals are licensed (they are).

But if the MDA did visit, it'd like what it saw.

At Northland, inquiring minds would discover that Tritabaugh has drastically reduced the amount of pesticides he uses, especially on the fairways, where he has not made an application in three years. The cool northern Minnesota nights help keep disease pressure low, yet Tritabaugh still pushes the envelope by not applying pesticides.

"I want to see how far we can go," Tritabaugh said, "and I've taken it right to the edge."

Tritabaugh also notes that at most golf courses, the person making the decision about the use of chemicals is formally educated in the field.

Tritabaugh said that if the MDA monitored golf courses more frequently it would probably help the image of the industry and add credence to that fact that superintendents are stewards of the environment and that courses do not have the perceived detrimental impact.

"It could maybe, maybe, put to rest the misunderstandings about golf courses," he said. "We could say, rather than take a look at our records, here is what the MDA audits show."

Minnesota only regulates "restricted-use" chemicals, and the definition is less stringent than other states. Many of the pesticides that golf courses apply do not fall under the "restricted use" definition. For the past few years Tritabaugh had not been putting down chemicals that fell under that umbrella. (This year an ant problem has forced his hand to add one such pesticide.)

That doesn't mean Tritabaugh or any other superintendent can purchase restricted-use pesticides at will. In order for a person to buy them, a proper permit has to be presented.

Tritabaugh said the MDA may not visit golf courses regularly because they have other priorities.

"They have so much effort they have to put into agriculture, they look at us as a small part of what they regulate," Tritabaugh said.

According to the MDA, in 2007, the most recent year for which there are records, Minnesota had 19,267,018 acres of harvested cropland. The Minnesota Golf Association said that there are just shy of 600 golf courses in the state, including nine-hole facilities.

PHOTO COURTESY: CHRIS TRITABAUGH

ONE 200-ACRE FARM FIELD RECEIVES CHEMICAL INPUTS OVER THE ENTIRE AREA, WHILE A 200-ACRE GOLF COURSE MIGHT BE APPLYING CHEMICALS TO NO MORE THAN 40 ACRES.

By comparison, one 200-acre farm field receives chemical inputs over the entire area, while a 200-acre golf course might be applying chemicals to no more than 40 acres. Many farms in Minnesota are hundreds of acres in size.

So while it might be true that in some places big brother doesn't come knocking on the gates of private country clubs often, that doesn't mean what goes on behind those gates is unscrupulous. In fact, if more people knew what was going on at places like Northland CC, they'd see that expert turf managers are handling the land they are entrusted with as carefully and respectfully as possible.

— Anthony Pioppi

Turn to page 24 for
ACCUSATION #4 ▶

At Northland Country Club in Duluth, Minn., superintendent Chris Tritabaugh hasn't made an application of pesticides to his fairways in three years. "I want to see how far we can go," he says.

ACCUSATION #4

Golf courses are rife with harmful pesticides.

THE DEFENSE CALLS TO THE STAND

Kyle Sweet, CGCS, The Sanctuary Golf Club on Sanibel Island in Florida and Greg Lyman, GCSAA's director, environmental programs

REBUTTAL

THE SANCTUARY Golf Club on Sanibel Island, Fla., is surrounded by one of the most visited national wildlife refuges in the country. The private club strikes a balance between a world-class Audubon Cooperative Sanctuary golf course and Mother Nature. Maintenance expectations are high even though the neighboring J.N. "Ding" Darling National Wildlife Refuge dictates what chemical products are applied on the course.

"When there's a new product we want to use, the refuge says 'yeah' or 'nay,'" says Kyle Sweet, CGCS.

As superintendent, Sweet is faced with a dual challenge: maintaining the health of the refuge's habitat while complying with Sanibel's golf course fertilizer and lake management recommendations.

It's all about the grass

Six years ago, Sanctuary Golf Club was battling a nasty cocktail of salty irrigation water, residual salts in island soils, and damaging salt spray during high winds. Consequently, the club converted from bermudagrass to paspalum. Now, Sanctuary features seashore paspalum everywhere.

"Where we are, you're going to have salt problems no matter what," Sweet says. "We average just less than 40 inches of rain a year, which is typically much less than the mainland. More salts and less rain led us to paspalum."

Since switching to paspalum, Sweet has cut nitrogen use in half for tees and fairways and reduced the nitrogen needed for greens by 70 percent. He uses a combination of slow- and quick-release products throughout the year, regulating soluble nitrogen rates to no more than half-pound rates. From January to August of 2011, nitrogen amounts for tees, fairways and greens were 3 pounds of nitrogen per 1,000 square feet.

"We have sandy soils, bad water, heavy shade and limited air movement, and we're still using less nitrogen to provide an improved playing surface," Sweet says.

Bye bye pests

Using pesticides in a wildlife refuge is controversial. But Sanctuary can use a limited amount of insecticides to combat pests such as mole crickets. To keep the mole cricket population down, Sweet slit-applies Chipco Choice (fipronil) on tees and fairways each spring. He uses Top Choice on greens for residual control and treats roughs with Orthene (acephate) in active mole cricket areas.

"I don't think the mole crickets like our soil as much as others because it's filled with seashells." Sweet says.

Worms, however, love Sanctuary's soil so much they have become the club's nemesis. Sanctuary's wooded milieu provides a haven for tropical sod webworm and armyworm adults, which in summer can create generations of larvae. Although Sanctuary has the OK to use Orthene, Conserve and B. thuringiensis for worm

At the Sanctuary Golf Club superintendent Kyle Sweet (left) and IPM manager Jason Craft have found success with a program that not only meets the course's needs, but also satisfies the needs of the surrounding wildlife refuge.

PHOTOS COURTESY: KYLE SWEET, CGCS

control, Sweet would like to gain approval for a residual control product for worms.

Nematodes also pose a problem for Sweet, who says he has gone so far as to remove soil and replace it with high quality topsoil to abolish his nematode problem. "Solid tine aerification and topdressing with topsoil into nematode affected areas also has worked pretty well," Sweet says. Although he admits, "We don't have a good solution for nematodes at this time."

Overblown argument

The effort that Sweet has to go through to overcome pests may be a special case, but Greg Lyman, GCSAA's director of environmental programs, says fundamentally superintendents are careful with pesticides.

"The position that pesticides are overused or misused? It's overblown," he says. "(Pesticides) are part of the control process, but superintendents are well versed in the use of many other techniques to grow a healthy turf plant."

There's also a financial reason to be smart with pesticides.

"The products are expensive," Lyman says. "It doesn't make sense to use them illogically."

— John Walsh

No. 12 at Sanctuary Golf Club

CLOSING ARGUMENT

By **Anthony L. Williams**, CGCS, CGM

TIMES ARE TOUGH. Some industries that lack the environmental foundations that exist within the golf industry may feel it necessary to ignore environmental responsibilities and cut parts of the business without evaluating the total impact of those cuts or seeking other options.

Not golf.

There is no room for thoughtless cuts and a lack of planning or vision in the successful golf course operation.

Golf is a business. But it's a business deeply tied to land. Protecting the land — and therefore the environment — is the first objective of a golf operation. When times are tough financially and cuts are mandated, golf courses make decisions based on property-specific data gathered from their programs, ensuring that the operation protects its natural resources but sustains itself with financial prudence. It's the cornerstone of achieving true sustainability within a golf operation, or any business, for that matter.

Golf is connected to the ecosystem that the course is built upon and the temptation to damage the larger asset to gain a short-term profit is just that, a temptation. The golf course superintendent sees the larger "green" picture. A superintendent knows the links between ecomonic strength and environmental responsibility. With years of experience, property knowledge and ongoing case studies, golf course operations are able to be financially responsive without harming the environment.

The evidence clearly points to the exceptional environmental stewardship that exists on golf courses. Plants and wildlife are flourishing with expanded nest box and naturalization programs.

Everyone benefits from the cleaner air and water generated by these profitable green businesses otherwise known as golf courses. Now is the time to validate and vindicate the golf industry and its environmental story.

So let go of your preconceived notions of golf courses and their effect on the environment. Open your mind to the new age of golf course maintenance. Visit a course and take a close look. I'm willing to bet you'll like what you see.

And we'd be honored if you'd give us that chance. ■

Clark Talks Turf

TIMELY TURF ADVICE

Follow the Water to Protect the Environment

Brian Horgan is an associate professor of turfgrass science at the University of Minnesota. Brian and his colleagues have studied the fate and transport of nutrients and pesticides from turfgrass stands. Brian can be reached at *bphorgan@umn.edu*.

Q Brian, to go along with the "Turf on Trial" theme this month, what do you think is the biggest environmental problem facing the golf industry?
Golfer expectations for perfect playing conditions are without a doubt the most significant problem the golf industry faces. Meeting these unrealistic expectations leads to high maintenance costs and large quantities of inputs. With the inputs comes the potential for environmental concerns.

In many instances, the end result is an unsustainable system used to maintain golf courses. Golfers and superintendents must be willing to accept less-than-perfect aesthetics while maintaining functional playing conditions. If the golf industry doesn't lead this change, it will be forced upon us. The major national golf organizations need to join together to lead the effort to moderate golfer expectations and achieve sustainability in golf course maintenance operations.

Q So we've identified the what, now who do you think is responsible for driving the golfer expectations for perfect playing conditions? The superintendent. Golfers have no idea of the limits turfgrass can be pushed or the level of conditioning that can be achieved, but superintendents sure do. It is a tribute to superintendents that they push beyond the current standards. But the net result is extreme playing conditions, unrealistic golfer expectations and large sums of money spent to make minor improvements – all in the quest for perfect playing conditions.

Superintendents are taught to be perfectionists. That is fine; however, they should pursue perfection in environmental stewardship. They should change their mindset and focus on the services that the golf course provides to the environment – services such as carbon sequestration, water purification, wellness and recreation for the community, etc.

Q Agronomically, what is the greatest environmental challenge?
Any surface water that leaves the property is a concern. Exit points for surface water include streams, wetlands, overland flow, gutters and tile drains. In every surface water sample we collect from our research plots we detect nutrients and pesticides.

The best method to reduce potential for environmental contamination is to reduce or prevent the loss of surface water from the property. Prevent water from flowing off a turfgrass stand directly into any water conveyance that leaves the property. For example, if water from a turfgrass stand flows into a lake with an outlet that ultimately leaves the property, work to prevent the water from ever reaching the lake. Incorporate bioswales or rain gardens into the golf course to retain surface water so it can either evaporate or infiltrate. Water from tile drains should be collected and reused if possible, or diverted to bioswales. Daylighting a tile drain into flowing water is asking for problems.

In short, follow the water and prevent surface flows of water from leaving the golf course.

Q What are other simple steps that can be taken to improve environmental performance on golf courses?
Soil testing is a tried and true technique to produce healthy turfgrass while minimizing inputs. Let's face it, soil testing is not glamorous, but it is effective. Superintendents need to soil test regularly, particularly on fairways and rough. Fairways and rough comprise the largest acreages of fertilized turf on a golf course. Hence, the largest amount of fertilizer is applied to these areas. Soil testing also offers the opportunity to save money by only applying the needed nutrients.

Q Any parting thoughts you'd like to share? We need the public to think of golf courses as an asset to their community. The environmental benefits and services a golf course provides can be numerous. We need to maximize these opportunities and show that a golf course is much more than a place to play golf.

Clark Throssell, Ph.D., loves to talk turf. He can be reached at clarkthrossell@bresnan.net.

Does your “to-do” list look like this?

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Photo courtesy of Vail Golf Club, Colorado

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TURFGRASS TRENDS

DOLLAR SPOT

Dollar Spot 101

An overview of the common and costly turfgrass disease

By J.B. Workman and C. Waltz

A turfgrass disease is caused by four factors occurring simultaneously: a susceptible host; a pathogen capable of infecting the host; environmental conditions that favor the development of disease; and sufficient time for infection to occur. Disease can play a role in determining the success or failure of a turfgrass stand. Most turfgrass diseases occur on a seasonal basis but can reoccur within a growing season.

The majority of turfgrass diseases are caused by fungi — simple organisms that do not have the ability to produce food photosynthetically because they lack chlorophyll. Consequently, they satisfy nutritional needs from living hosts, while some feed solely on organic residue. Parasitic fungi are those that live as saprophytes until environmental conditions become favorable for infecting host plants. Facultative saprophytes function primarily as parasites but can subsist temporarily on decaying organic residue.

Dollar spot, among the most common and costly fungal diseases on golf courses, athletic fields and home lawns, is caused by the facultative saprophyte *Sclerotinia homoeocarpa*. Dollar spot was initially described as a disease in the 1920s, when the causal agent was thought to be a *Rhizoctonia* species. It was not until the 1930s that the pathogen was reclassified as *S. homoeocarpa*.

The classification remains controversial because DNA studies indicate that the fungus is more closely related to members of the genus *Rutstroemia*, *Lanzia*, or *Moellerodiscus* rather than *Sclerotinia*. Classifying dollar spot in its proper taxonomic standing allows for better control of the disease with fewer resistance issues from fungicide applications. Proper classification would also give turfgrass managers considering biocontrol an opportunity to introduce natural enemies that are known to suppress fungi more closely related to members of the correct genus.

The fungus survives during the winter as mycelium in infected thatch just below the soil surface living off dead organic materials. The disease has an unusual cycle of development in that it remains inactive for most of the year. When environmental conditions become favorable, it can rapidly develop into an epidemic growth phase. Epidemics typically occur when temperatures rise above 50° F, and they can persist until temperatures exceed 90° F. There are potentially two strains of the fungus: one that occurs during cool weather, when the temperature is below 75° F; and a second that is favored by high humidity, warm days and cool nights. When either of those conditions is met, the fungus will grow on the turf's surface and infect leaf blades via direct penetration, wounds and natural openings.

Continued on page 30

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OUR SPONSORS

FIGURE 1

FIGURE 2

Dollar spot on greens and fairways (Figure 1) can range in size from a quarter to a silver dollar. A certain diagnosis of dollar spot can be made by examining the grayish-white, fluffy mycelium (Figure 2) in the early morning hours before the turf has been mowed.

Continued from page 29

Dollar spot can infect both warm- and cool-season turfgrass species. Primary species affected are Kentucky bluegrass, bentgrass, tall fescues, zoysiagrass, bermudagrass and seashore paspalum. Disease severity is most commonly seen in the spring and fall on warm- and cool-season species, while warm-season species can remain susceptible throughout the summer months. On fine textured and closely mown turf, such as golf course putting greens and fairways, the disease symptoms are characterized by round, straw-colored, sunken patches ranging from the size of a U.S. quarter to the size of a U.S. silver dollar (about 1 to 2 inches in diameter) (Figure 1).

If the disease becomes severe, individual patches may coalesce, forming larger, irregular patches of blighted turfgrass that can die back to the soil surface. On residential lawns, where turf is maintained at higher mowing heights, the dead spots appear larger and more diffuse (2 to 3 inches in diameter). Under those conditions, dollar spot can be distinguished by characteristic lesions that are light tan with a reddish-brown border, usually radiating from the margins of the leaf blades. Leaf lesions can expand extending across the entire leaf, resulting in girdling of blades and dieback from leaf tips. Individual leaf blades may have a single lesion, many small lesions or be entirely blighted.

A more certain diagnosis of the disease can be made by examining the grayish-white, fluffy mycelium in the early morning before the turf has been mowed. The mycelium of the fungus can usually be seen spreading outward from the infected lesions to adjacent host tissues (Figure 2).

To meet the high expectation of aesthetic quality and playability, golf course superintendents and athletic field managers have relied on fungicide applications, cultural practices and the use of nitrogen fertilizers to obtain acceptable control.

Fungicides must be applied at labeled rates when environmental conditions are favorable for disease development. To limit the possibility of fungicide resistance, it is important to alternate the use of fungicides that have different modes of action. The Fungicide Resistance Action Committee (FRAC) coding is a tool turfgrass managers can use to know which fungicides have similar modes of action. FRAC gives fungicides a certain number or letter code (e.g. 4, M2 or U) based on their chemistry. The practical application of FRAC is it gives turfgrass managers an easy method for determining which fungicides to alternate. For example, Banner Maxx and Eagle have a FRAC code of 3. They both inhibit cell membrane synthesis. Therefore, the possibility of resistance would be greater if they were only alternated with each other in a season-long disease control program.

Accordingly, the development of resistance to dollar spot would be less likely if fungicides like Heritage (11) and Daconil Ultrex (M4) were alternated during a grow-

PHOTOS COURTESY: J.B. WORKMAN